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Notes:

1. Untranslatable words are replaced with asterisks (***).
2. Texts in the figures are not translated and shown as it is.

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CLAIM + DETAILED DESCRIPTION

[Claim(s)]

[Claim 1]

A cooking-by-heating machine which is provided with the following and characterized by allocating a discharge nozzle of said overheated steam in said hot wind generator in a cooking-by-heating machine which cooks a cooked thing by heating with said overheated steam.

A heat chamber in which a cooked thing is accommodated.

A hot wind generator which supplies a hot wind which can cook only it by heating to a heat chamber.

A saturation-water-vapor generator to which water is changed at saturation water vapor.

A superheated steam generator which heats saturation water vapor and is made to generate overheated steam.

[Claim 2]

The cooking-by-heating machine according to claim 1 allocating said discharge nozzle so that the discharge mouth may be located near the heater in said hot wind generator.

[Claim 3]

The cooking-by-heating machine according to claim 1 allocating said discharge nozzle so that the discharge mouth may be located near the hot wind blow-off part from said hot wind generator in said heat chamber.

[Claim 4]

The cooking-by-heating machine according to any one of claims 1 to 3 characterized by forming a steamy deflection plate near the discharge mouth of said discharge nozzle.

[Claim 5]

The cooking-by-heating machine according to any one of claims 1 to 4 raising discharge speed of overheated steam by extracting a path of a discharge mouth of said discharge nozzle.

[Claim 6]

The cooking-by-heating machine according to any one of claims 1 to 5, wherein said saturation-water-vapor generator and said superheated steam generator are formed in one.

[Claim 7]

The cooking-by-heating machine according to any one of claims 1 to 6, wherein said two or more hot wind generators are allocated in said heat chamber.

[Detailed Description of the Invention]

[0001]

[Field of the Invention]

This invention relates to the cooking-by-heating machine which cooks a cooked thing by heating. It is related with the cooking-by-heating machine which cooks a cooked thing by heating with overheated steam more than 100 degreeC especially.

[0002]

[Description of the Prior Art]

By overheated steam more than 100 degreeC which heated saturation water vapor further, the cooking-by-heating machine which cooks by heating cooked things, such as foodstuffs, is known well. In this cooking-by-heating machine, the water supplied from the water tank etc. with the saturation-water-vapor generator generates saturation water vapor, this saturation water vapor is further heated with a superheated steam generator, and overheated steam is generated. It cooks by heating by supplying this overheated steam in the heat chamber which accommodated the cooked thing. The temperature in a heat chamber turns into a predetermined temperature according to a cooked thing, if cooking time suitable for a cooked thing passes, supply of overheated steam will be stopped and cooking will be completed.

[0003]

By using overheated steam, it is possible to prevent evaporation of moisture in a cooked thing and to cook to the result carried out gently. The inside of a heat chamber becomes close to a non-oxygen state, and it can reduce oxidization of a cooked thing while being able to shorten cooking time, since overheated steam is [the heat transfer coefficient] higher than air.

[0004]

About the structure of the cooking-by-heating machine which uses conventional overheated steam, what supplies overheated steam directly in a heat chamber is proposed (refer to patent documents 1).

[0005]

[Patent documents 1]

JP,H9-4849,A

[0006]

[Problem to be solved by the invention]

The temperature of the overheated steam generated with the superheated steam generator is higher than the temperature in a heat chamber with a natural thing. In a cooking-by-heating machine like patent-documents 1 description, if overheated steam is supplied in a heat chamber, relatively, by the discharge mouth circumference of the inside of a heat chamber, or overheated steam where temperature is low especially a discharge nozzle, and a cooked thing, overheated steam will be cooled and it will dew. The problem that the waterdrop generated with an inside, a discharge nozzle, etc. of the heat chamber by this dew condensation cannot disperse, and it cannot adhere to a cooked thing, or a cooked thing cannot fully heat if it dews on the surface of a cooked thing, or the surface of a cooked thing becomes diluted, and a result worsens arises. Its time and effort for cleaning increases while the dew condensation by the inside of a heat chamber causes dirt and is very insanitary.

[0007]

This invention is made in view of the above-mentioned point, and is a thing.

In the cooking-by-heating machine which cooks a cooked thing by heating, the purpose is to provide the

cooking-by-heating machine which suppresses overheated steam being cooled and dewing by the inside of the discharge mouth circumference of overheated steam, or a heat chamber, and a cooked thing, and demonstrates the outstanding heating efficiency by overheated steam.

[0008]

[Means for solving problem]

The heat chamber in which a cooked thing is accommodated as for this invention in order to solve the above-mentioned technical problem, A hot wind generator which supplies the hot wind which can cook only it by heating to a heat chamber, It had the saturation-water-vapor generator from which water is changed to saturation water vapor, and the superheated steam generator which heats saturation water vapor and is made to generate overheated steam, and the discharge nozzle of said overheated steam was allocated in said hot wind generator in the cooking-by-heating machine which cooks a cooked thing by heating with said overheated steam.

[0009]

According to this composition, the temperature of the discharge mouth circumference of overheated steam is maintainable to a temperature higher than the temperature of a heat chamber. Since overheated steam is efficiently mixed with a hot wind, high temperature is maintained even if sent in in a heat chamber. As a result, it is possible to suppress for overheated steam to be cooled and to dew by the inside of the discharge mouth circumference of overheated steam or a heat chamber and a cooked thing. It is possible to realize outstanding heating efficiency by overheated steam by the temperature fall of overheated steam itself being suppressed.

[0010]

In this invention, near the heater in said hot wind generator, said discharge nozzle of said overheated steam was allocated so that the discharge mouth of this discharge nozzle might be located.

[0011]

according to this composition, overheated steam can be heated further and overheated steam of a temperature higher than the overheated steam generated with the superheated steam generator is generated -- things can be carried out. As a result, heating at a still higher temperature is attained and efficient cooking by heating is possible.

[0012]

In this invention, near the hot wind blow-off part from said hot wind generator in said heat chamber, said discharge nozzle of said overheated steam was allocated so that said discharge mouth might be located.

[0013]

According to this composition, overheated steam can be efficiently mixed to a hot wind, high temperature can be maintained, and the discharge mouth of overheated steam can be directly exposed to a hot wind. As a result, it is possible to suppress further the dew condensation in the discharge mouth circumference of overheated steam.

[0014]

In this invention, the steamy deflection plate was formed near [said] the discharge mouth of said overheated steam.

[0015]

According to this composition, it prevents overheated steam hitting a cooked thing directly, and the field

of the cooked thing circumference is made to diffuse overheated steam, and it can send into it. As a result, it is possible to lessen heating nonuniformity of a cooked thing. It is possible to prevent an unnecessary burn.

[0016]

In this invention, the discharge speed of overheated steam was raised by extracting the path of said discharge mouth of said overheated steam in said superheated steam generator.

[0017]

According to this composition, even a cooked thing can make overheated steam arrive. A cooked thing can be heated locally. As a result, it is possible to realize the result of shortening of cooking time and reduction of power consumption being attained, and attaching a scorch to the portion of a request of a cooked thing intentionally.

[0018]

In this invention, said saturation-water-vapor generator and said superheated steam generator shall be formed in one.

[0019]

Since the surface area of parts becomes small according to this composition, diffusion of heat can be lessened. Since it is not necessary to provide these as a separate device respectively, it is possible to reduce part mark. As a result, it becomes possible to improve the energy efficiency of a cooking-by-heating machine. A cost cut, the simplification of structure, and reduction of a part occupancy space are attained.

[0020]

In this invention, said two or more hot wind generators shall be allocated in said cooking appliance.

[0021]

According to this composition, a hot wind and overheated steam can be applied to a cooked thing from two or more different directions. A hot wind and overheated steam are more sendable into the wide range in a heat chamber in a short time. As a result, it is possible for there to be no heating nonuniformity and to cook a cooked thing efficiently. Since the heating nonuniformity in [whole] a heat chamber can be stopped, cooking efficiently is possible even when the cooked thing is placed over the wide range in a heat chamber. And it is possible to deal with various cooked things and various recipes.

[0022]

[Mode for carrying out the invention]

Hereafter, the embodiment of this invention is described based on figures.

[0023]

Drawing 1 is made into the front view of the cooking-by-heating machine concerning a 1st embodiment of this invention, and is expressed by a perspective diagram method. Drawing 2 is an outline sectional view of the cooking-by-heating machine shown in drawing 1. The cooking-by-heating machine 1 has the rectangular parallelepiped-like case 10. The rectangular parallelepiped-like heat chamber 11 is formed in the inside of the case 10. The upper and lower sides of the heat chamber 11 comprise the ceiling wall 12 and the bottom wall 13, and Mikata comprises the back inner side wall 14, the left inner side wall 15, and the right inner side wall 16 among 4 rounds. Remaining one side of 4 rounds is constituted by the door 17 which can be opened and closed freely. The measures against heat insulation are taken against each wall and the door 17 of the heat chamber 11.

[0024]

The blower module 20 is installed in the outside of the back inner side wall 14. The blower module 20 stations the fan 22 in the fan casing 21, and rotates this fan 22 by a motor (not shown). The fan casing 21 is connected to the top hot wind generator 23 provided in the outside of the ceiling wall 12.

[0025]

The top hot wind generator 23 has the top hot wind blow-off part 30 which carries out an opening toward the heat chamber 11. The suction part 31 of the blower module 20 is formed in the back inner side wall 14 of the heat chamber 11. The top hot wind blow-off part 30 and the suction part 31 consist of a set of a small hole.

[0026]

The upper heater 40 is arranged in the top hot wind generator 23. Above the upper heater 40, the superheated steam generator 41 is arranged on the outside of the top hot wind generator 23. The superheated steam generator 41 has the overheated steam discharge nozzle 42 and the steamy valve 43. In the top hot wind generator 23, the overheated steam discharge nozzle 42 is allocated towards the lower part from the upper part of the top hot wind generator 23 so that discharge of the overheated steam may be carried out. The overheated steam discharge mouth 42a is formed at the tip. The overheated steam discharge nozzle 42 may be allocated towards a transverse direction from the side wall of the top hot wind generator 23. The saturation-water-vapor generator 45 made to generate saturation water vapor via the steamy delivery pipe 44 is connected to the superheated steam generator 41. The above-mentioned steamy valve 43 adjusts the quantity of the saturation water vapor from the saturation-water-vapor generator 45. The boiler feeding device 47 is connected to the saturation-water-vapor generator 45 via the water supply pipe 46, and the water supply is adjusted by the water supply valve 48.

[0027]

The control part (not shown) which performs operation control of the blower module 20, top hot wind generator 23, superheated steam generator 41, saturation-water-vapor generator 45, boiler feeding device 47, and cooking-by-heating machine 1 whole is arranged on the outside of the right inner side wall 16. The navigational panel 18 which inputs the directions to this control part into the front of the outside of the right inner side wall 16 is arranged.

[0028]

The turntable 60 for laying the cooked thing 70 is arranged at the bottom wall 13. On the turntable 60, support means (not shown), such as a grill and a rack, are laid according to the kind of cooked thing 70.

[0029]

The operation of the cooking-by-heating machine 1 is as follows. First, the door 17 is opened and what suited the turntable 60 out of support means, such as a grill and a rack, at the kind of cooked thing 70 is laid. It places, where the cooked thing 70 is put into direct or a container on it, and the door 17 is closed.

[0030]

After closing the door 17, cooking conditions are inputted from the navigational panel 18. A control part (not shown) chooses the optimal thing out of two or more recipes currently programmed beforehand based on the inputted cooking conditions. And the blower module 20, the top hot wind generator 23, the superheated steam generator 41, the saturation-water-vapor generator 45, and the boiler feeding device 47 are driven, and cooking by heating is started.

[0031]

The blower module 20 inhales the air in the heat chamber 11 from the suction part 31, and sends it out to

the top hot wind generator 23. With the upper heater 40 formed in the top hot wind generator 23, the air breathed out from the blower module 20 turns into a hot wind, and blows off from the top hot wind blow-off part 30. Here, the overheated steam discharge nozzle 42 is allocated so that discharge of the overheated steam may be carried out into the top hot wind generator 23 (refer to drawing 2). Therefore, since the temperature of the overheated steam discharge nozzle 42 circumference is maintainable to a temperature higher than the temperature of the heat chamber 11, it is possible to suppress for overheated steam to be cooled and to dew. Since it is efficiently mixed with a hot wind by breathing out overheated steam in a hot wind air current, high temperature is maintained even if sent in in the heat chamber 11.

[0032]

Drawing 3 is an outline sectional view showing the cooking-by-heating machine concerning a 2nd embodiment of this invention. The outline of composition is the same as that of said 1st embodiment.

[0033]

The overheated steam discharge nozzle 42 is allocated in the place where the overheated steam discharge mouth 42a becomes the closest to the upper heater 40 towards the lower part from the upper part of the top hot wind generator 23. in this embodiment, overheated steam can be heated further and overheated steam of a temperature higher than the overheated steam generated with the superheated steam generator 41 is generated -- things can be carried out. The overheated steam discharge nozzle 42 may be allocated towards a transverse direction like a 1st embodiment from the side wall in the top hot wind generator 23.

[0034]

Drawing 4 is an outline sectional view showing the cooking-by-heating machine concerning a 3rd embodiment of this invention. The outline of composition is the same as that of said 1st and 2nd embodiments.

[0035]

The overheated steam discharge nozzle 42 runs through the top hot wind generator 23 towards a lower part from the upper part of the top hot wind generator 23, and the overheated steam discharge mouth 42a is allocated in about 30 top hot wind blow-off part. In this embodiment, since it blows off so that a hot wind may cover the breathed-out overheated steam from the upper part, it is possible to mix overheated steam efficiently to a hot wind, and to maintain high temperature, and the overheated steam discharge mouth 42a can be directly exposed to a hot wind. The overheated steam discharge nozzle 42 may be allocated towards a transverse direction from the side wall in the top hot wind generator 23. The overheated steam discharge nozzle 42 may be allocated so that the overheated steam discharge mouth 42a may be located in any by the side of the top hot wind generator 23 of the top hot wind blow-off part 30, or the heat chamber 11.

[0036]

Drawing 5 is an outline sectional view showing the cooking-by-heating machine concerning a 4th embodiment of this invention. The outline of composition is the same as that of said 1st [the] thru/or a 3rd embodiment.

[0037]

The overheated steam discharge nozzle 42 is allocated in the place where the overheated steam discharge mouth 42a becomes the closest to the upper heater 40 towards the lower part from the upper part of the top hot wind generator 23. And the steamy deflection plate 49 is horizontally allocated in the neighborhood lower part of the overheated steam discharge mouth 42a. In this embodiment, it prevents

overheated steam hitting the cooked thing 70 directly, and the field of the cooked thing 70 circumference is made to diffuse overheated steam, and it can send into it. The overheated steam discharge nozzle 42 may be allocated towards a transverse direction like a 1st embodiment from the side wall of the top hot wind generator 23. In connection with this, the steamy deflection plate 49 is allocated perpendicularly.

[0038]

Drawing 6 is the elements on larger scale showing the overheated steam discharge mouth circumference of the cooking-by-heating machine concerning a 5th embodiment of this invention. As shown in a figure, the overheated steam discharge nozzle 42 is constituted so that the path of the overheated steam discharge mouth 42a may be extracted. And the overheated steam spit hole 30a is established in the top hot wind blow-off part [directly under] 30 of the overheated steam discharge mouth 42a. Thereby, the discharge speed of overheated steam improves. Therefore, overheated steam is energized and can send overheated steam into the heat chamber 11 in a short time. Since overheated steam reaches the cooked thing 70, without the vigor becoming weaker, it can heat the cooked thing 70 locally.

[0039]

Drawing 7 is an outline sectional view showing the cooking-by-heating machine concerning a 6th embodiment of this invention. The outline of composition is the same as that of said 1st embodiment.

[0040]

The integral-type superheated steam generator 50 which the saturation-water-vapor generator 45 and the superheated steam generator 41 of said 1st embodiment shown in drawing 1 and drawing 2 unified is arranged above the upper heater 40 on the outside of the top hot wind generator 23. The overheated steam discharge nozzle 42 and the steamy valve 43 are formed in the integral-type superheated steam generator 50 like said superheated steam generator 41. The boiler feeding device 47 is connected via the water supply pipe 46, and the water supply is adjusted by the water supply valve 48. Within the integral-type superheated steam generator 50, saturation water vapor is generated from water and overheated steam is generated after that. The steamy valve 43 adjusts the quantity of the saturation water vapor generated within a device. In this embodiment, since diffusion of heat can be lessened by making small surface area of the parts which generate steam, it becomes possible to improve the energy efficiency of a cooking-by-heating machine. A cost cut and the simplification of structure are attained by reduction of part mark.

[0041]

Drawing 8 is made into the front view of the cooking-by-heating machine concerning a 7th embodiment of this invention, and is expressed by a perspective diagram method. Drawing 9 is an outline sectional view of the cooking-by-heating machine shown in drawing 8. The outline of composition is the same as that of said 1st [the] thru/or a 4th embodiment.

[0042]

The fan casing 21 is 2-way branch-type, and is connected to the top hot wind generator 23 provided in the outside of the ceiling wall 12, and the side hot wind generator 24 provided in the outside of the left inner side wall 15. The side hot wind generator 24 has the side hot wind blow-off part 32 which carries out an opening toward the heat chamber 11. The side hot wind blow-off part 32 consists of a set of a small hole.

[0043]

The horizontal heater 51 is arranged in the side hot wind generator 24. On the left-hand side of the

horizontal heater 51, the superheated steam generator 41 is arranged on the outside of the side hot wind generator 24. The saturation-water-vapor generator 45 is arranged above the side hot wind generator 24. Composition and connection of these devices are the same as that of them which it had above the top hot wind generator 23.

[0044]

The blower module 20 inhales the air in the heat chamber 11 from the suction part 31, and carries out discharge to the top hot wind generator 23 and the side hot wind generator 24. With the upper heater 40 and the horizontal heater 51 which were formed in the top hot wind generator 23 and the side hot wind generator 24, the air breathed out from the blower module 20 turns into a hot wind, and blows off from the top hot wind blow-off part 30 and the side hot wind blow-off part 32. In this embodiment, a hot wind and overheated steam can be applied to the cooked thing 70 from two or more different directions. As a result, it is possible for there to be no heating nonuniformity and to cook the cooked thing 70 efficiently. A hot wind and overheated steam are more sendable into the wide range in the heat chamber 11 in a short time.

[0045]

Although the embodiment of this invention was shown as mentioned above, various change can be added and carried out in the range which does not deviate from the main point of an invention. For example, it is also possible to combine a dielectric-heating means with this invention.

[0046]

[Effect of the Invention]

Since the discharge nozzle of overheated steam is allocated in a hot wind generator according to the above-mentioned composition of this invention, the temperature of the discharge mouth circumference of overheated steam is maintainable to a temperature higher than the temperature of a heat chamber. Since overheated steam is efficiently mixed with a hot wind by breathing out overheated steam in a hot wind air current, high temperature is maintained even if sent in in a heat chamber. As a result, it is possible to suppress for overheated steam to be cooled and to dew by the inside of the discharge mouth circumference of overheated steam or a heat chamber and a cooked thing. It is possible to realize outstanding heating efficiency by overheated steam by the temperature fall of overheated steam itself being suppressed.

[0047]

It is possible by sending a hot wind into a heat chamber from use of a steamy deflection plate, and two or more directions for there to be no heating nonuniformity and to cook a cooked thing efficiently. Since the heating nonuniformity in [whole] a heat chamber can be stopped, cooking efficiently is possible even when the cooked thing is placed over the wide range in a heat chamber. And it is possible to deal with various cooked things and various recipes.

[Brief Description of the Drawings]

[Drawing 1]What was made into the front view of the cooking-by-heating machine concerning a 1st embodiment of this invention, and was expressed by the perspective diagram method

[Drawing 2]The outline sectional view of the cooking-by-heating machine shown in drawing 1

[Drawing 3]The outline sectional view showing the cooking-by-heating machine concerning a 2nd embodiment of this invention

[Drawing 4]The outline sectional view showing the cooking-by-heating machine concerning a 3rd embodiment of this invention

[Drawing 5]The outline sectional view showing the cooking-by-heating machine concerning a 4th embodiment of this invention

[Drawing 6]The elements on larger scale showing the overheated steam discharge mouth circumference of the cooking-by-heating machine concerning a 5th embodiment of this invention

[Drawing 7]The outline sectional view showing the cooking-by-heating machine concerning a 6th embodiment of this invention

[Drawing 8]What was made into the front view of the cooking-by-heating machine concerning a 7th embodiment of this invention, and was expressed by the perspective diagram method

[Drawing 9]The outline sectional view of the cooking-by-heating machine shown in drawing 8

[Explanations of letters or numerals]

1 Cooking-by-heating machine

11 Heat chamber

20 Blower module

23 Top hot wind generator

24 Side hot wind generator

30 Top hot wind blow-off part

31 Suction part

32 Side hot wind blow-off part

40 Upper heater

41 Superheated steam generator

42 Overheated steam discharge nozzle

42a Overheated steam discharge mouth

45 Saturation-water-vapor generator

47 Boiler feeding device

50 Integral-type superheated steam generator

51 Horizontal heater

[Translation done.]